

Listing of Claims:

1. (Currently Amended) An impeller assembly to be installed in a pump having a pump housing for enclosing a pumping chamber, an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure, and a rotatable shaft that is to be operatively coupled to a pump driving device, the impeller assembly comprising:

a cutter bar to be coupled to the pump housing adjacent to the inlet flange; and

an impeller for imparting a centrifugal force on fluid entering the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar when the cutter bar is coupled to the pump housing to form a clearance between the impeller and the cutter bar, wherein

the impeller comprises a concavity shaped to direct at least a portion of the fluid entering the pumping chamber generally toward the clearance between the impeller and the cutter bar, wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of the impeller, and wherein the chopping blade comprises a serrated portion that passes adjacent to the cutter bar during rotation of the impeller.
2. (Cancelled)
3. (Currently Amended) The impeller assembly according to claim 2 1, wherein the cutter bar is adjustably coupled to the pump housing between the inlet flange and the impeller to allow adjustment of the clearance between the chopping blade and the cutter bar.
4. (Cancelled)
5. (Currently Amended) The impeller assembly according to claim 4 1, wherein the serrated portion comprises a plurality of teeth.
6. (Currently Amended) The impeller assembly according to claim 2 1, wherein the

- clearance is suitably sized such that rotation of the impeller adjacent to the ~~cutting blade~~ cutter bar imparts a shearing force on objects entrained in the fluid entering the pumping chamber.
7. (Original) The impeller assembly of claim 1, wherein the cutter bar is to be coupled to the pump housing by a plurality of fasteners that are adjustable externally of the pump housing without disassembling the pump housing.
 8. (Original) The impeller assembly according to claim 7, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing by adjusting the plurality of fasteners.
 9. (Currently Amended) The impeller assembly according to claim 1, wherein the clearance is suitably sized such that rotation of the impeller adjacent to the ~~cutting blade~~ cutter bar imparts a shearing force on objects entrained in the fluid entering the pumping chamber.
 10. (Original) The impeller assembly according to claim 1, wherein the cutter bar is adjustably coupled to the pump housing between the inlet flange and the impeller to allow adjustment of the clearance between the impeller and the cutter bar.
 11. (Original) The impeller assembly according to claim 10, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing.
 12. (Original) The impeller assembly according to claim 11, wherein the external adjustment of the clearance between the impeller and the cutter bar can be performed without disassembling the pump housing.
 13. (Original) The impeller assembly according to claim 1 further comprising an inspection port provided to the pump housing, the inspection port permitting observation of the clearance between the impeller and the cutter bar.
 14. (Currently Amended) The impeller assembly of claim 1, wherein the impeller comprises a surface in a plane extending radially from a central axis to oppose the inlet flange, and a chopping blade having a curved member normal to the plane, wherein

the curved member is shaped to create a vortex when rotated and comprises an edge to be rotated about the central axis adjacent to the ~~cutting~~ cutter bar.

15. (Currently Amended) An impeller assembly to be installed in a pump having a pump housing for enclosing a pumping chamber, an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure, and a rotatable shaft that is to be operatively coupled to a pump driving device, the impeller assembly comprising:

a cutter bar to be adjustably coupled to the pump housing adjacent to the inlet flange; and

an impeller for imparting a centrifugal force on fluid entering the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar when the cutter bar is coupled to the pump housing to form a clearance between the impeller and the cutter bar, wherein

a position of the cutter bar is adjustable relative to the impeller to provide adjustment of the clearance between the cutter bar and the impeller,

wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of the impeller, and

wherein the chopping blade comprises a serrated portion that passes adjacent to the cutter bar during rotation of the impeller.

16. (Original) The impeller assembly according to claim 15, wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of rotation of the impeller.
17. (Original) The impeller assembly according to claim 16, wherein the chopping blade comprises a serrated portion to be rotated adjacent to the cutter bar during rotation of the impeller within the pumping chamber.

18. (Original) The impeller assembly according to claim 17, wherein the serrated portion comprises a plurality of teeth.
19. (Currently Amended) The impeller assembly according to claim 15, wherein the clearance is suitably sized such that rotation of the impeller adjacent to the ~~cutting blade~~ cutter bar imparts a shearing force on objects entrained in the fluid entering the pumping chamber.
20. (Original) The impeller assembly according to claim 15, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing.
21. (Currently Amended) The impeller assembly according to claim 15, wherein the impeller comprises a surface in a plane extending radially from a central axis to oppose the inlet flange, and a chopping blade having a curved member normal to the plane, wherein the curved member is shaped to create a vortex when rotated and comprises a distal edge to be rotated about the central axis adjacent to the ~~cutting~~ cutter bar.
22. (Currently Amended) A pump comprising:

a pump housing for enclosing a pumping chamber, the pump housing having an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, and an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure;

a rotatable shaft that is to be operatively coupled to a pump driving device;

a cutter bar; and

an impeller for imparting a centrifugal force on fluid being introduced into the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar within the pump housing to form a clearance between the impeller and the cutter bar, wherein

the impeller comprises a concavity shaped to direct at least a portion of the fluid entering the pumping chamber generally toward the clearance between the impeller and the cutter bar as the impeller is rotated,

wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of the impeller, and

wherein the chopping blade comprises a serrated portion that passes adjacent to the cutter bar during rotation of the impeller.

23. (Original) The pump according to claim 22, wherein the impeller comprises a chopper blade extending from the impeller in a direction to oppose the cutter bar within the pump housing.
24. (Original) The pump according to claim 23, wherein the chopper blade comprises a serrated portion that is to be rotated adjacent to the cutter bar as the impeller is rotated.
25. (Original) The pump according to claim 24, wherein the serrated portion comprises a plurality of teeth.
26. (Original) The pump according to claim 22, wherein the clearance is suitably sized such that rotation of the impeller adjacent to the cutter bar imparts a shearing force on objects entrained in the fluid being introduced into the pumping chamber.
27. (Original) The pump according to claim 22 further comprising a plurality of fasteners for coupling the cutter bar to the pump housing adjacent to the inlet flange.
28. (Original) The pump according to claim 27, wherein the plurality of fasteners are adjustable externally of the pump housing to adjust the clearance between the impeller and the cutter bar.
29. (Original) The pump according to claim 22 further comprising an inspection port to permit observation of at least the clearance between the impeller and the cutter blade.

30. (Original) The pump according to claim 29, wherein the inspection port is provided to the inlet flange.

31. (Currently Amended) A pump comprising:

a pump housing for enclosing a pumping chamber, the pump housing having an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, and an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure;

a rotatable shaft that is to be operatively coupled to a pump driving device;

a cutter bar; and

an impeller for imparting a centrifugal force on fluid being introduced into the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar within the pump housing to form a clearance between the impeller and the cutter bar, wherein

a position of the cutter bar is adjustable relative to the impeller within the pump housing to provide adjustment of the clearance between the cutter bar and the impeller,

wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of the impeller, and

wherein the chopping blade comprises a serrated portion that passes adjacent to the cutter bar during rotation of the impeller.

32. (Original) The pump according to claim 31, wherein the impeller comprises a concavity shaped to direct at least a portion of the fluid in the pumping chamber generally toward the clearance between the impeller and the cutter bar.

33. (Original) The pump according to claim 31, wherein the impeller comprises a

chopping blade that extends from the impeller in a direction generally parallel to a central axis of rotation of the impeller.

34. (Original) The pump according to claim 33, wherein the chopping blade comprises a serrated portion to be rotated adjacent to the cutter bar during rotation of the impeller within the pumping chamber.
35. (Original) The pump according to claim 34, wherein the serrated portion comprises a plurality of teeth.
36. (Currently Amended) The pump according to claim 31, wherein the clearance is to be adjusted to a suitable distance such that rotation of the impeller adjacent to the ~~cutting~~ blade cutter bar imparts a shearing force on objects entrained in the fluid entering the pumping chamber.
37. (Original) The pump according to claim 31, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing.
38. (Currently Amended) The pump according to claim 31, wherein the impeller comprises a surface in a plane extending radially from a central axis to oppose the inlet flange, and a chopping blade having a curved member normal to the plane, wherein

the curved member is shaped to create a vortex when rotated and comprises a distal edge to be rotated about the central axis adjacent to the ~~cutting~~ cutter bar.
39. (Currently Amended) A pump comprising:

a pump housing that defines a pumping chamber, the pump housing having an inlet flange through which a fluid is to be introduced into the pumping chamber at a first pressure, and an outlet flange through which the fluid is to be discharged from the pumping chamber at a second pressure;

a rotatable shaft that is to be operatively coupled to a pump driving device;

a cutter bar;

an impeller for imparting a centrifugal force on fluid being introduced into the pumping chamber, the impeller being mountable on the shaft at a distance from the cutter bar within the pump housing to form a clearance between the impeller and the cutter bar; and

wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of the impeller, and

wherein the chopping blade comprises a serrated portion that passes adjacent to the cutter bar during rotation of the impeller.

an inspection port for observing the clearance between the impeller and the cutter bar.

40. (Original) The pump according to claim 39, wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of rotation of the impeller.
41. (Original) The pump according to claim 40, wherein the chopping blade comprises a serrated portion to be rotated adjacent to the cutter bar during rotation of the impeller within the pumping chamber.
42. (Original) The pump according to claim 41, wherein the serrated portion comprises a plurality of teeth.
43. (Currently Amended) The pump according to claim 39, wherein the clearance is to be adjusted to a suitable distance such that rotation of the impeller adjacent to the ~~cutting blade~~ cutter bar imparts a shearing force on objects entrained in the fluid entering the pumping chamber.
44. (Original) The pump according to claim 39, wherein the clearance between the impeller and the cutter bar is adjustable externally of the pump housing.
45. (Original) The pump according to claim 39, wherein the impeller comprises a surface

in a plane extending radially from a central axis to oppose the inlet flange, and a chopping blade having a curved member normal to the plane, wherein

the curved member is shaped to create a vortex when rotated and comprises a distal edge to be rotated about the central axis adjacent to the cutting bar.

46. (Cancelled)

47. (Cancelled)

48. (Cancelled)

49. (Cancelled)

50. (Currently Amended) A method for operating a pump, the pump comprising a pump housing enclosing a pumping chamber, an inlet flange through which a fluid can enter the pumping chamber, an outlet flange through which the fluid is discharged from the pumping chamber, and a cutter bar coupled adjacent to the inlet flange, the method comprising:

receiving a fluid through the inlet flange;

rotating an impeller, which wherein the impeller comprises a chopping blade that extends from the impeller in a direction generally parallel to a central axis of the impeller, and wherein the chopping blade comprises a serrated portion that passes adjacent to the cutter bar during rotation of the impeller, adjacent to the cutter bar to chop objects entrained in the fluid; chopping said objects in the serrated portion, and

directing at least a portion of the fluid entering the pumping chamber generally toward a clearance between the impeller and the cutter bar.

51. (Original) The method according to claim 50 further comprising the steps of:

observing the clearance between the impeller and the cutter bar through an inspection port;
and

Application No.: 10/672,460

Response dated: January 9, 2006

Reply to Office Action of September 9, 2005

adjusting a position of the cutter bar to create a suitably sized clearance.